Interim Management Plan for Blacklock Tidal Marsh Restoration Site

Project Location
SUISUN MARSH, SOLANO COUNTY, CALIFORNIA
USGS 7.5 Minute Quadrangle: Denverton

Contact Person: Cassandra Enos, Phone: (916) 227-7617

Prepared by:

Environmental Services Office
Department of Water Resources
Sacramento, California

And

Suisun Resource Conservation District
Suisun, California

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1. INTRODUCTION

The Blacklock property was purchased in December 2003 for the Suisun Marsh Property Acquisition and Habitat Restoration Project. This project, funded by CALFED and the Suisun Marsh Preservation Agreement agencies (U.S. Bureau of Reclamation, Department of Water Resources, Department of Fish and Game, and Suisun Resource Conservation District), includes acquisition of a seasonally managed wetlands for the purpose of conversion to tidal marsh. The project participants have identified the following project goals and objectives.

> Goals: (1) increase the area and continuity of tidal brackish emergent wetlands in Suisun Marsh to aid in the recovery of listed and sensitive species, and (2) acquire scientific knowledge that leads to improved understanding of tidal marsh restoration processes, strategies, and ecological outcomes within Suisun Marsh.
>
> Restoration objectives: restore the Blacklock property to functioning brackish tidal marsh by restoring tidal action, reversing subsidence, and promoting establishment of native vegetation and a tidal marsh channel network appropriate to this location within the San Francisco Estuary.
>
> Science objectives: allow for and encourage collaborative science opportunities in the project design and monitoring phases that supports regional adaptive resource management needs.

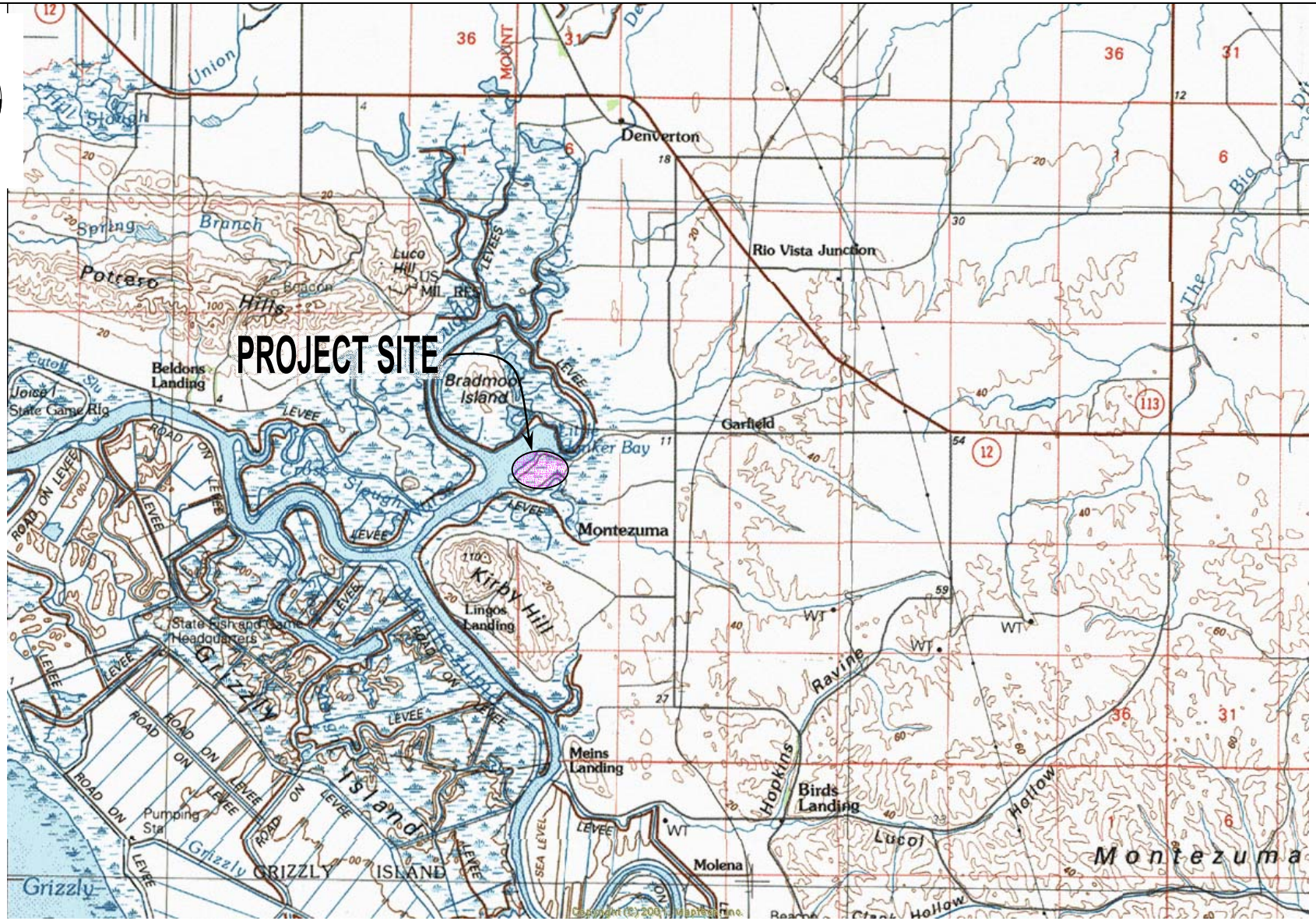
The CALFED funding covered acquisition of a parcel, pre-project monitoring, and development of a restoration plan. Additional funding will be sought for development of environmental documentation, project construction, and post-project monitoring. It is estimated that the period between acquisition of the property and project construction will be approximately 3 years. This plan has been developed to guide property management during this interim period.

1.1 SITE DESCRIPTION

1.1.1 Physical Conditions

The Blacklock property is located in the northeast Suisun Marsh bordering Little Honker Bay (Figures 1 and 2). The property has been owned and operated by the Blacklock family since 1936, and has been used for livestock grazing and duck hunting activities since 1946 (DWR 2003). The parcel is approximately 70 acres, which includes about 67 acres seasonal wetland and 3 acres upland/levee.

The property is surrounded by approximately 1.5 miles of levees. Almost all of the levees (~1.3 miles) are exterior levees along Little Honker Bay or adjacent sloughs. The elevation of the exterior levees is about 8.0 feet NAVD, plus or



0 2 4 6 8
MILES

= APPROXIMATE SITE LOCATION

SOURCE:
30 x 60 USGS TOPOGRAPHIC MAP
LODI, CALIFORNIA QUADRANGLE
1:100,000 SCALE

FIGURE 1
PROJECT SITE LOCATION
SOLANO COUNTY, CALIFORNIA

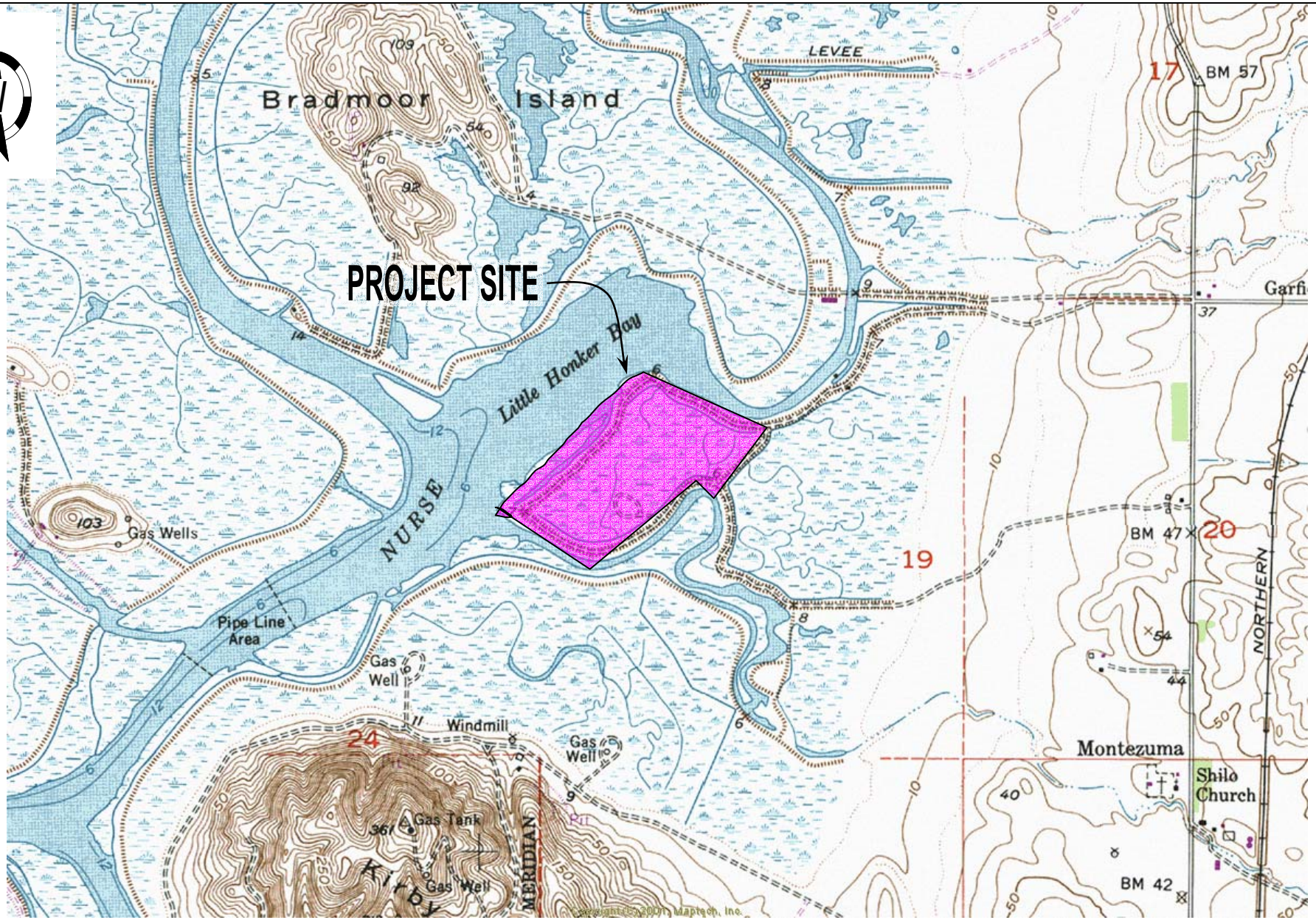


FIGURE 2

PROJECT SITE LOCATION
SOLANO COUNTY, CALIFORNIA

minus 0.5 foot. The width of the levee crown is variable, ranging from 6 to 10 feet. There is a short interior levee (~1,000 feet) between the Blacklock property and the Blacklock Ranch. This levee is slightly higher at about 8.5 feet NAVD and wider at about 10-12 feet. Tidal elevations in the vicinity of the property range from ~0.6 feet mean lower low water to ~6 feet mean higher high water with a mean sea level of ~3.5 feet. It is apparent from the condition of the levees that occasional overtopping occurs. Repairs to several sections of the levee were made by DWR in the fall of 2003.

The property contains two abandoned gas wells. Blacklock Number One was drilled in 1951 and abandoned in 1954. Blacklock Number Two was drilled in 1954 and abandoned in 1972. Both wells were capped and decommissioned according to accepted industry and government standards in 1954 and 1972 respectively (DWR 2003). The wells are classified as being "plugged and abandoned – dry hole" by Weatherford Artificial Lift Systems, Inc., the previous well owner. Weatherford relinquished all rights to Mr. Blacklock in January 2003, and ownership of the wells passed to DWR with purchase of the parcel. The well pad for Blacklock Number One was dismantled and removed from the site; while the well pad for Blacklock Number Two is still intact (Figures 3 and 4). Remnants of the roads leading to the well pad still exist on the site.

There is one water control structure for both flooding and draining the property (Figure 5). The structure consists of a 30-inch corrugated metal pipe with a screwflap gate on the slough side and a winch flap gate on the interior side. The gate was installed in ___ and is in good working order. There is also a __ inch corrugated metal pipe under the road to the well pad to allow circulation in an interior ditch that runs along the interior toe of the levees.

An elevation survey of the site was conducted by DWR's Survey Unit. A map of the survey elevations is shown in Figure 7. Elevations at the site range from approximately -1.5 feet up to 9 feet (NAVD 88). With the exception of the levees and the two well sites, the remainder of the property is less than about 3 feet.

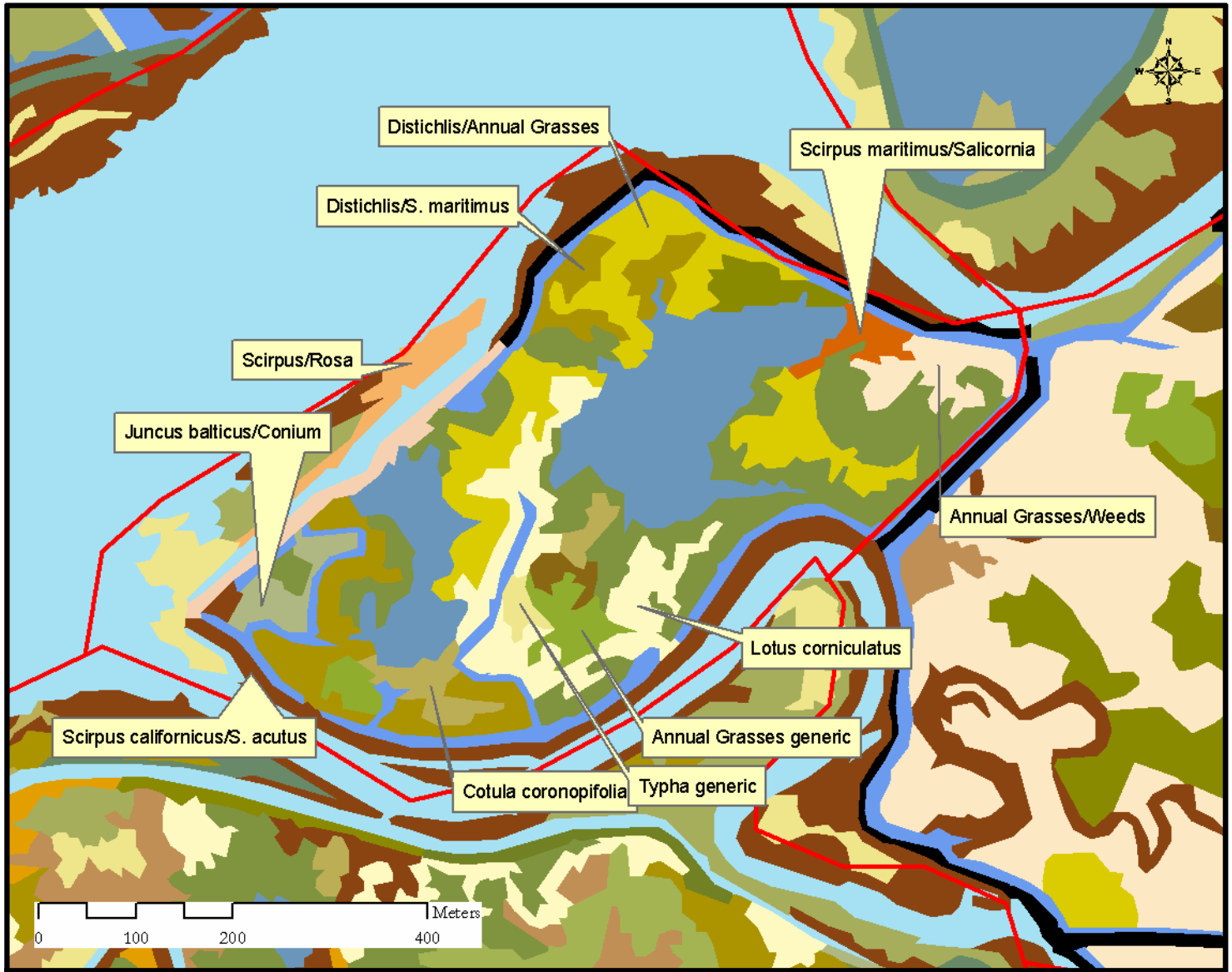
1.1.2 Vegetation

A vegetation map of Suisun Marsh was created in 1999 and updated in 2000 by the Department of Fish and Game. Figure 6 shows the Blacklock portion of the vegetation map. Vegetation in the wetland consists primarily of tules (*Scirpus acutus*), cattails (*Typha*) and saltgrass (*Distichlis spicata*), with some waterfowl food plants such as brass buttons (*Cotula coronopifolia*) and alkali bulrush *(Scirpus maritimus*). Vegetation along the levee includes native rose (*Rosa californica*), blackberry (*Rubus discolor*), and annual grasses.

Figure 3 View of one of the two openings from the top of the abandoned natural gas well pad Blacklock #2. There was no observable cap or any other device used for capping a well.

Figure 4 View of second opening from the top of the abandoned natural gas well pad Blacklock #2. There was no observable cap visible from the top; only Bermuda grass (Cynodon dactylon) was observed.

Figure 5. View of water control structure.



Source:
Department of Water Resources 1999 Vegetation Map of Suisun Marsh

Figure 6 Vegetation Map of Blacklock Restoration Site
Solano County, California

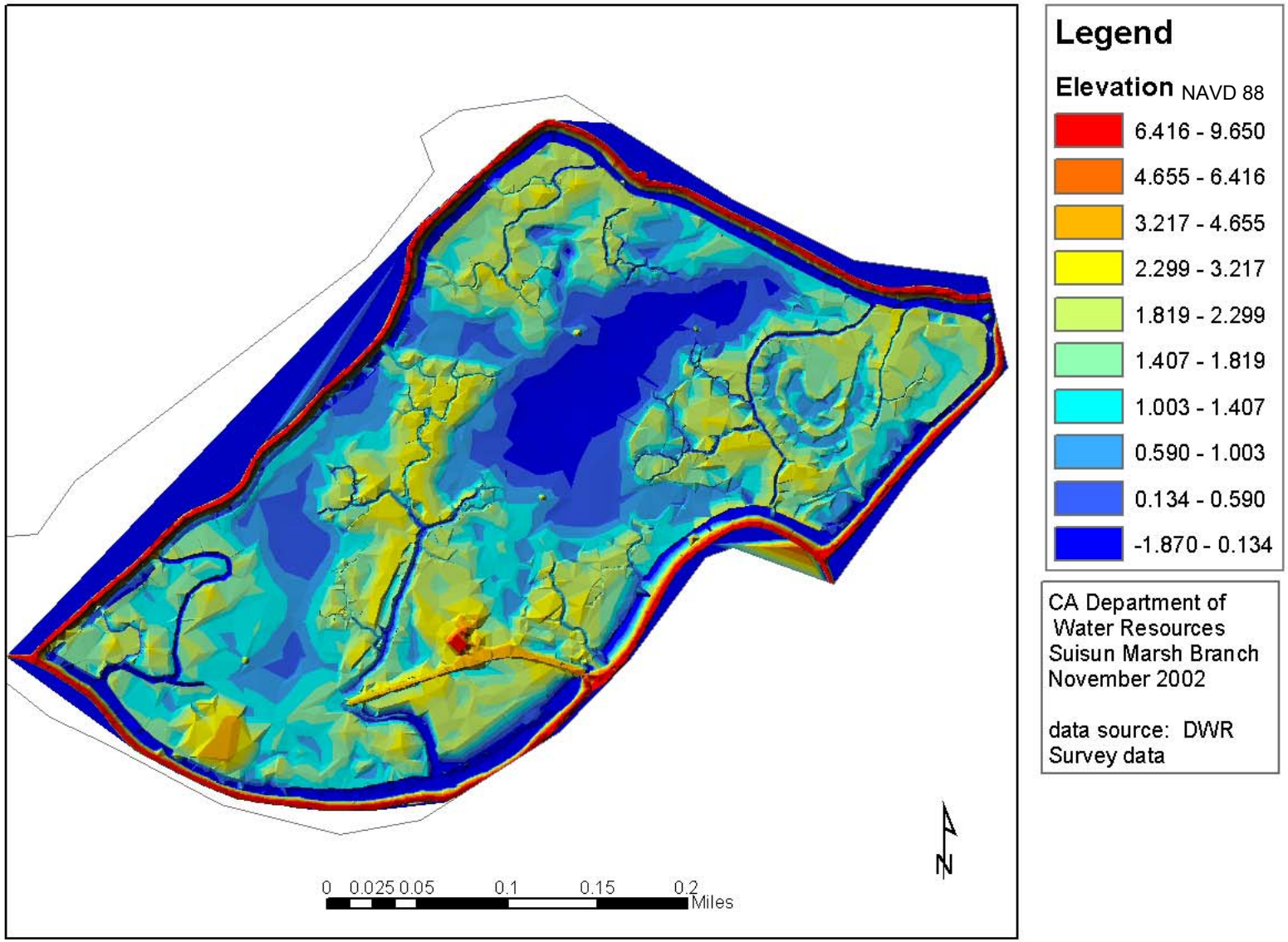


Figure 7. Blacklock elevation map

1.1.3. ESA Listed Species

Suisun Marsh provides habitat to numerous plants, fish, and wildlife, including some that are endemic to the Marsh. The following is a list of endangered species act listed species and species of concern that may be found in the project area.

ESA listed species:

- Salt marsh harvest mouse (USFWS)
- California clapper rail (USFWS)
- Central Valley steelhead (NMFS)
- Central Valley spring-run Chinook salmon (NMFS)
- winter-run Chinook salmon and winter-run Chinook salmon critical habitat (NMFS)
- Delta smelt and Delta smelt critical habitat (USFWS)
- Sacramento splittail (USFWS)
- Suisun thistle (USFWS)
- Soft bird's-beak (USFWS)

Species of concern:

- Saltmarsh common yellowthroat (USFWS)
- Suisun song sparrow (USFWS)
- Western pond turtle (USFWS)
- Mason's lilaeopsis (USFWS)
- Suisun Marsh aster (USFWS)
- Delta tule-pea (USFWS)
- Pacific lamprey (NMFS)
- Suisun ornate shrew (USFWS)

Suitable SMHM habitat has been identified in the area of the Blacklock acquisition. DWR's 1999 vegetation map indicates that *Salicornia* is present on the site; however, DWR biologists have determined that this existing SMHM habitat is suboptimal. Initial surveys by DWR biologists on the Western parcel of the Blacklock Ranch have estimated that there are few (10 captured) present on the site. Additional surveys will be conducted in the spring of 2004. Surveys for plant species of concern will be conducted in 2004.

1.2 PAST MANAGEMENT

The past owner used the entire Blacklock Ranch property primarily for grazing, with some waterfowl hunting in the southwest portion of the Blacklock Ranch including the 70 acres acquired by DWR. Management on the wetland area was minimal, consisting primarily of flooding and circulation during duck hunting season.

The Suisun Resource Conservation District (SRCD) has developed 11 water management schedule guidelines to assist wetland property owners and managers. The goal of these water management schedules is to optimize the waterfowl forage and cover value. Selection of the appropriate water

management schedule is based on location in the Marsh, water control facilities, and water type. Location of a club will determine whether or not its management is affected by endangered species closures. Clubs affected by endangered species closures must restrict or close water intake structures during specific periods to prevent adverse impacts to Chinook salmon and/or delta smelt.

Past club management was inconsistent and did not strictly adhere to any of SRCD's water management schedules. Initial flooding of the ponds started in early to mid-October. Ponds were flooded to a maximum depth of 12". Water levels remained static (at the same time allowing adequate circulation) through mid-December at which time the water level was lowered slightly to make invertebrates more easily accessible to feeding waterfowl. Intakes were closed from February 21st through March 31st due to salmon closure requirements. The pond was drained by mid- to late-June and allowed to dry out for cattle grazing. Based on the existing topography and interviews with the owner, disking and ditching on the property was minimal.

Levee maintenance appears to have been minimal and inadequate to protect the property from occasional overtopping. The levees were maintained primarily by borrowing material from the interior toe ditch. It appears that rip-rap was periodically imported to maintain a portion of the exterior levee along little Honker bay. Needed levee maintenance was deferred by Mr. Blacklock prior to sale of the property.

2.0 ANALYSIS OF POTENTIAL MANAGEMENT GOALS

Several potential management goals have been proposed for this site. Each of these management goals must be achieved utilizing existing strategies for seasonal wetland management. During the interim management period, land use at the site will continue to be a seasonal wetland. The following is a discussion of each of the proposed goals and an evaluation of the benefits/drawbacks of each.

2.1 HIGH QUALITY WATERFOWL CLUB

One management goal is to manage the club to obtain high quality waterfowl habitat. The purpose of this management goal would be to evaluate the effect conversion of waterfowl habitat to tidal marsh has on waterfowl use. This would seek to provide information that would be useful in the context of the greater CBDA goals for Suisun Marsh. Selection of this management goal would require the following management actions:

- ✓ Intensive water control manipulation
- ✓ Intensive vegetation control – mowing, disking, planting

- ✓ Potential increase in necessary infrastructure – e.g. additional water control structure

This management goal would be advantageous because it would provide:

- ✓ High quality waterfowl habitat
- ✓ Inform larger CBDA goals (evaluate effects of waterfowl habitat conversion)

Disadvantages of this management goal include:

- ✓ High cost of intensive management actions
- ✓ Potential inconsistency with restoration goals
- ✓ Potential loss/reduction of existing habitat values
- ✓ Timeframe inconsistent with restoration process - long time period needed to improve habitat to desired quality

2.2 RETAIN PAST PRACTICES

This management goal would be to maintain the property in a manner consistent with past management. Attempts would be made to mimic the management strategies of the previous property owner. Selection of this management goal would require the following management actions:

- ✓ Moderate water control manipulation
- ✓ Minimal vegetation control – mowing, disking, planting
- ✓ Cattle grazing on property during summer months

This management technique would be advantageous for the following reasons:

- ✓ Cost of management actions would be low
- ✓ It would allow for collection of more extensive baseline data
- ✓ It would provide habitat to the same suite of species that currently use the site

Disadvantages of this management goal include:

- ✓ Potential inconsistency with restoration goals
- ✓ Past management strategy was inconsistent so it would be difficult to duplicate

2.3 PREPARE SITE FOR RESTORATION

This management goal is to maintain the property in a manner that will not conflict with, and will work towards, the long-term goals of tidal marsh restoration. This management goal may be achieved by implementing actions that increase vegetation cover at the site prior to breaching. Actions could also incorporate studies evaluating methods for subsidence reversal strategies and

where necessary, substrate modification. Information from these studies would be used to inform other restoration projects. Selection of this goal would require the following management actions:

- ✓ Moderate water control manipulation
- ✓ Moderate vegetation control
- ✓ Investigation of techniques for subsidence control and substrate modification

This management goal would be advantageous for the following reasons:

- ✓ Actions would be consistent with the long-term goal of tidal marsh recovery
- ✓ Actions would likely speed evolution from managed marsh to tidal marsh
- ✓ Inform the larger CBDA goals

Disadvantages of this management goal include:

- ✓ Potentially high cost of management actions
- ✓ Potential loss or reduction of existing habitat values

2.4 FOCUS ON MINIMIZING OR MAXIMIZING CERTAIN ECOLOGICAL CONDITIONS

This management goal is to manage the property to maximize or minimize a given ecological condition. An example could be to minimize salt marsh harvest mouse habitat to prevent take of the species or habitat during restoration. Depending on the ecological condition being maximized or minimized the management actions could vary. However, actions are likely to include:

- ✓ Moderate to intensive water control manipulation
- ✓ Moderate to intensive vegetation control

Advantages of this management alternative include:

- ✓ Maximize or minimize an ecological condition consistent with restoration goals
- ✓ Potential to reduce species take during restoration

Disadvantages of this management alternative include:

- ✓ Potentially high cost of management actions
- ✓ Potential loss or reduction of existing habitat values
- ✓ Timeframe potentially inconsistent with restoration process

2.5 SITE CONSTRAINTS

Selection of a management alternative must also consider site constraints. The following management constraints have been identified for this site:

2.5.1 U.S. Army Corps of Engineers Regional General Permit. All management activities must be covered under the USACE RGP for activities in the Suisun Marsh. This permit covers typical management activities conducted by seasonal wetland landowners in Suisun Marsh. This includes activities such as excavation of interior ditches, grading, disking, replacement of water control structures, and levee repair. The permit places limits on each of the activities based on the size of the property.

2.5.2 Environmental Assessment/Initial Study for Western Blacklock Acquisition. An Environmental Assessment/Initial Study was completed prior to acquisition to fulfill NEPA/CEQA requirements for the acquisition of Western Blacklock. The EA/IS stated that the site would continue to be managed as a seasonal wetland. All management actions must be consistent with this land use. However, the EA/IS does allow for adaptive management and scientific studies.

2.5.3 Endangered Species Act Gate Closures and Restrictions. The USFWS and NOAA Fisheries have placed diversion restrictions in various areas of the marsh to protect delta smelt and Chinook salmon. Due to its location in the marsh, the Blacklock property is not subject to delta smelt restrictions or closures. However, the site is subject to the following Chinook salmon closures and restrictions:

Restricted Flow: November 1 – last day of duck hunting season
Intakes Closed: February 21 – March 31

These restrictions/closures are in effect during all water year types. Restricted flow is defined as no more than 25% of the water control structure's diversion capacity. These closures are enforced under the USACE RGP discussed above.

2.6 SELECTION OF MANAGEMENT GOAL

The Blacklock Advisory Team, a multi-agency team of scientists, was responsible for selecting the preferred management goal. Factors considered in the selection included:

- ✓ cost of actions need to achieve the management goal;
- ✓ ability to obtain necessary pre-project monitoring during implementation of management actions;
- ✓ effects on existing habitat and species; and,
- ✓ impacts of management actions on long-term restoration goal.

The Advisory Team determined the best alternative would be a combination of two of the proposed goals: "Retain Past Management Practices" and "Prepare Site for Restoration". Where possible, past management practices would be retained, except when past management actions conflict with the long-term goal of tidal marsh restoration. For example, past management practices included cattle grazing. Cattle grazing is considered to be inconsistent with the long-term goal of tidal marsh restoration. Therefore, this past management action will be

eliminated. This approach to interim management will preserve, to the extent possible, existing habitat values while minimizing actions that are inconsistent with tidal marsh restoration.

3.0 MANAGEMENT ACTIONS

Management actions are designed to meet the management goals stated above. Management actions will remain consistent with seasonal wetland management actions as described by SRCD (1998). However, management actions may be adapted as necessary to allow for scientific monitoring/research. All work done will conform to the terms and conditions of the U.S. Army Core of Engineers Regional General Permit Number 3.

3.1 LEVEES

Levees will be repaired as necessary to maintain levee integrity. Levee width/height will not be upgraded except as necessary to allow equipment to access levee repair sites. Levee maintenance/management will include the following.

Inspections: Levees will be inspected on no less than a monthly basis. Inspectors will make a written record of levee condition and notify the project manager if any repairs are required. Inspections may occur more frequently during winter.

Vegetation Control: Levees will be mowed on an as needed basis, likely about 2-3 times per year. Mowing will be restricted to the levee crown only. The levee sides shall be mowed only if necessary to allow for inspection/repair of the levee. Levees will be sprayed with an herbicide twice a year to reduce growth of upland weeds along the levee crown. Any herbicide used will be approved for use in the Marsh.

3.2 WATER CONTROL

The water control structures will be operated as necessary to meet the water management goals. Past water management included drying of the ponds during the summer months to allow for cattle grazing. However, this has been determined to be inconsistent with the goal of tidal marsh restoration. In order to prevent cattle grazing and soil acidification (see below) ponds will likely remain flooded year around. The only management schedule that includes year around flooding is the Permanent Pond/Brood Pond. The main objective of permanent ponds is to establish submergent vegetation such as sago pondweed (*Potamogeton pectinatus*) and wigeongrass (*Ruppia maritima*) for food and invertebrate structure, tall emergents like tule for cover, and to exchange high

volumes of low salinity water. The goal is to exchange the high salinity pond water with the lower salinity channel water when the river runoff is high and channel water salinity drops to low levels (SRCD 1998). The typical water management pattern throughout the year is shown in figure 9.

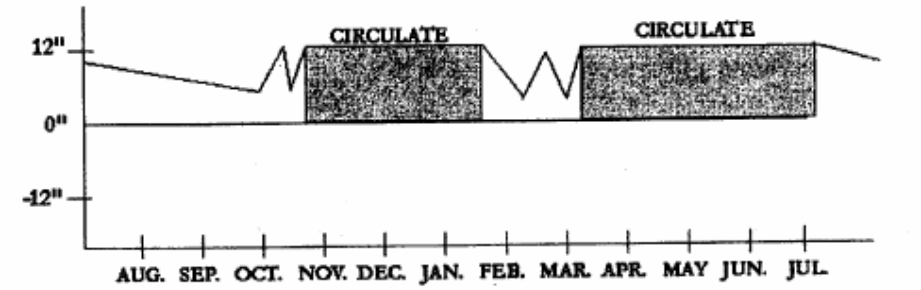


Figure 8. Brood pond/permanent pond water management schedule
Source: SRCD 1998

The water control structures will be operated to maximize circulation and maintain a water depth of approximately 12" year around. The water management schedule will be modified to allow for Chinook salmon closure period, 2/21 – 3/21. During this period the gates will be completely closed to prevent adverse impacts to salmon. Operation of the water control structures will be adapted as necessary based on weather, tides, and water year type.

Pond Bottom: Traditional management techniques include burning, disking and mowing. These techniques are used, in part, to alter the vegetative composition of the pond. Based on the short interim management period and the long-term goals of the site, it is anticipated that these management strategies will not be utilized at this site. The disturbance of the soil surface caused by these activities creates conditions that are favorable for exotic species. Many exotic species thrive where there is little vegetation cover or where the soil surface is disrupted (Callaway and Sullivan 2001). In addition, these activities require that the pond bottom be dried out completely, which can cause adverse effects to soil water chemistry and soil accretion (see below).

Implementation of the permanent pond water management schedule in the absence of mowing, disking or burning during the interim management period may result in extensive growth of emergent vegetation such as cattails and tules in the pond bottom. This is consistent with the goal of tidal marsh restoration. Marsh vegetation increases the amount of inorganic sediment accretion. Vegetated flats have been found to have sediment deposition rates as high as five times those of unvegetated flats (Friedrichs and Perry 2001). In addition the accretion rate of inorganic sediment increases with grass stem density. Therefore, promoting extensive emergent vegetation growth during the interim

management period will likely result in increased sediment deposition during the restoration process.

Soils: Existing soil conditions will be evaluated during pre-project monitoring. It is possible that acid sulfate soils or "cat clays" will be found in the pond. In natural conditions, marsh soils are waterlogged and anaerobic. Complete drying of these soils causes accelerated decomposition of marsh litter, subsidence, oxidation of soils and drastically lowered pH (Heitmeyer et al 1989). Subsequent inundation of these soils with alkaline waters results in suspension of dissolved iron which precipitates as ferric hydroxide, causing "red water". These conditions are toxic to some plants and invertebrates. Past management techniques included annual drying of the pond bottom to allow for cattle grazing. Red water has been observed at the ponds during the summer months (Enos notes). The permanent inundation of the soils may help to increase the pH during the interim management period. However, tidal flooding does not always correct [low pH soils] (Callaway 2001). Additional soil treatments may be necessary based on pre-project monitoring results.

Nuisance Plant Species Control: Control of nuisance/invasive plant species prior to tidal marsh restoration is a high priority. Exotic plants are of concern at restored wetlands because they alter ecosystem functioning. The grading and/or excavation that occurs during restoration creates ideal conditions for disturbance-limited species to establish (Callaway and Sullivan 2001). Therefore, it is preferable to remove exotic species from the site prior to restoration to help prevent/reduce invasion during restoration. Based on pre-project vegetation monitoring, an exotic species control plan will be developed and implemented.

3.3 MOSQUITO CONTROL

There are about 2,500 species of mosquitoes worldwide and about 53 species in California (CCMVCD 2002). Mosquitoes have four life stages: egg, larval, pupa, and adult. Some mosquito species lay single eggs on water surfaces; others lay single eggs on moist soil where later flooding is likely. Still other species lay batches of eggs, called rafts, 100 or more at a time on water surfaces. Eggs deposited on water surfaces usually hatch within a day or so, but eggs laid on soil surfaces do not hatch until flooding occurs, which may be months or even years later (University of California 1998). The Suisun Marsh provides conditions in which all three types of mosquitoes can breed.

Mosquito populations can be controlled through a combination of biological control, habitat manipulation, and chemical control. The most effective way to inhibit mosquito production in managed wetlands is through water management. The Solano County Mosquito Abatement District (SCMAD) tries to

lower mosquito populations by working with landowners to implement water management schedules that inhibit mosquito production. If this is not effective, chemical control is employed.

Permanently flooded ponds limit the risk of mosquito production. Mosquitoes do not have a chance to lay eggs on drying mud, so there is less of a chance for proper egg laying and hatching conditions. There is still a risk of permanent water species such as the *Anopheles* and *Culex* spp., but deeper water with high circulation deters mosquitoes from laying eggs (SRCD 1998).

Mosquito control does not appear to be a significant problem at the site. SCMAD has record of only two treatments at the site: October 1998 and October 2000. The interim management actions will keep the pond permanently flooded, which should inhibit mosquito production. SCMAD annually samples the water for mosquito production. If the number of larvae is considered excessive the pond will be rapidly drained to kill the larvae. The pond will be reflooded without letting the soil dry out, preventing additional mosquito egg laying on the drying soil.

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